Document number: **72.120.601**

Document title: **FGM 160 Operating Instructions**

Scope: **ISO 9001:2008 §7.2.3**

Additional Information (when applicable)

D	2014.01.20	Proofread and updated	JB	AP	CT	MB	MW
C	2013.01.30	Removed from User Manual, updated: changes in text formatting; modifying graphics in Appendix II and Electronic modules	MKJ	KH	-	MW	MW
B	2009.06.02	Updated information	AAJ	RT	N/A	N/A	AAJ
A	2007.11.30	Issued for Fluenta release; moved to User Manual	MS	RT	-	N/A	AAJ
Rev. index	Issue date	Reason for issue	Author	Review	Review	Review by QA	Approved

Replacement for:		Total pages: **26**
Fluenta source doc. (for translations):		

TABLE OF CONTENTS

1. Purpose 3

2. Abbreviations/Definitions 3
2.1 Abbreviations 3
2.2 Definitions 3

3. General Information 3
3.1 Hardware Description 3
3.1.1 Electrical Connections 4
3.1.2 Power Supply 4
3.1.3 Input Signals 4
3.1.3.1 Ultrasonic Transducers 4
3.1.3.2 Pressure and Temperature Transmitters 5
3.1.4 Output Signals 5
3.1.4.1 Modbus Communication (RS-485) 5
3.1.4.2 Foundation Fieldbus Output 5
3.1.4.3 Current Loop Outputs 5
3.1.4.4 HART Output 5
3.1.4.5 Pulse/Frequency Output 5
3.1.5 Electronic Modules in FGM 160 6
3.1.5.1 Digital Signal Processing (DSP) Module 6
3.1.5.2 Analog Front End (AFE) Module 6
3.1.5.3 Pressure & Temperature (P&T) Module 6
3.1.5.4 Input/Output (I/O) Module 6
3.1.5.5 Intrinsic Safety Barrier (IS Barrier) Module 6
3.1.5.6 Surge Protection Module 6
3.1.5.7 Local Display Module 7
3.1.6 Non-Resettable Counter Function 7
3.2 Firmware Description 7
3.2.1 DSP Module 7
3.2.2 P&T Module 8
3.2.3 I/O Module 8
3.3 Device Integrity 8
3.3.1 Self-Checking 8
3.3.2 Watchdog Timer 9
3.3.3 Flash Memory 9
3.4 Configuration and Operating Software 9

4. Operating Procedure 10
4.1 Introduction 10
4.2 Power-Up Sequence 10
4.3 Field Computer Configuration 10
4.4 Local Display Functions 11
4.5 Error Check and Troubleshooting 12
4.5.1 Error Check with Local Display 12
4.5.2 Error Check with O&SC 13

5. References 14

6. Appendix I – System Configuration File 15

7. Appendix II – Inserting settings from Client parameter list 19

1. PURPOSE

This document describes the Fluenta Flare Gas Meter, FGM 160 hardware and software, and the device integrity.

2. ABBREVIATIONS/DEFINITIONS

2.1 Abbreviations

TFS	Transducer Full Size
TCV	Transducer Compact Version

2.2 Definitions

Module	PC-board with a local controller and a processor

3. GENERAL INFORMATION

3.1 Hardware Description

The FGM 160 Field Computer, illustrated in Figure 1, is designed as a distributed system. The FGM 160 consists of five or six modules, the Digital Signal Processing (DSP) module, the Analog Front End (AFE) module, the Pressure & Temperature (P&T) module, Input/Output (I/O) module, Intrinsic Safe Barrier (IS Barrier) module, Surge Protection module and the Local Display. A distributed system gives several advantages. This design will be more flexible with respect to future expansions and modifications, as the total processing load for the system can be divided in several modules. Thus, the danger of overloading a single CPU unit is reduced.

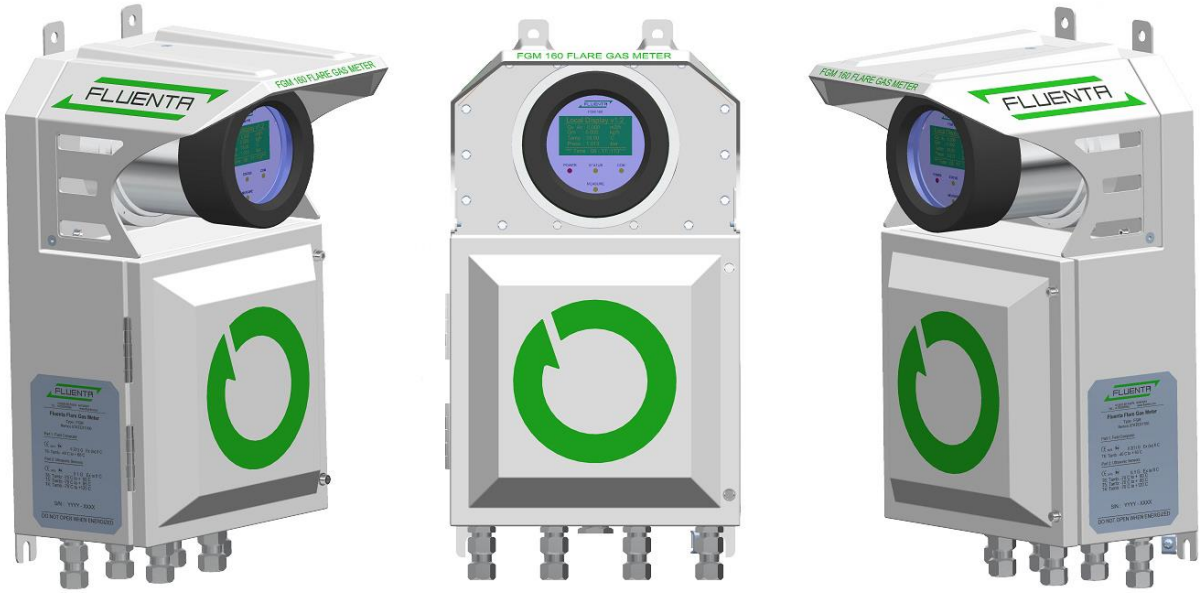


Figure 1: FGM 160 Field Computer.

The FGM 160 is certified for operation in Hazardous Area.

For detailed information regarding Hazardous Area installation and operation, please refer to Fluenta Doc. no. 62.120.006 (Hazardous Area Installation Guidelines [1]) and 75.120.215 (FGM 160 Hazardous Area Certificates [2]).

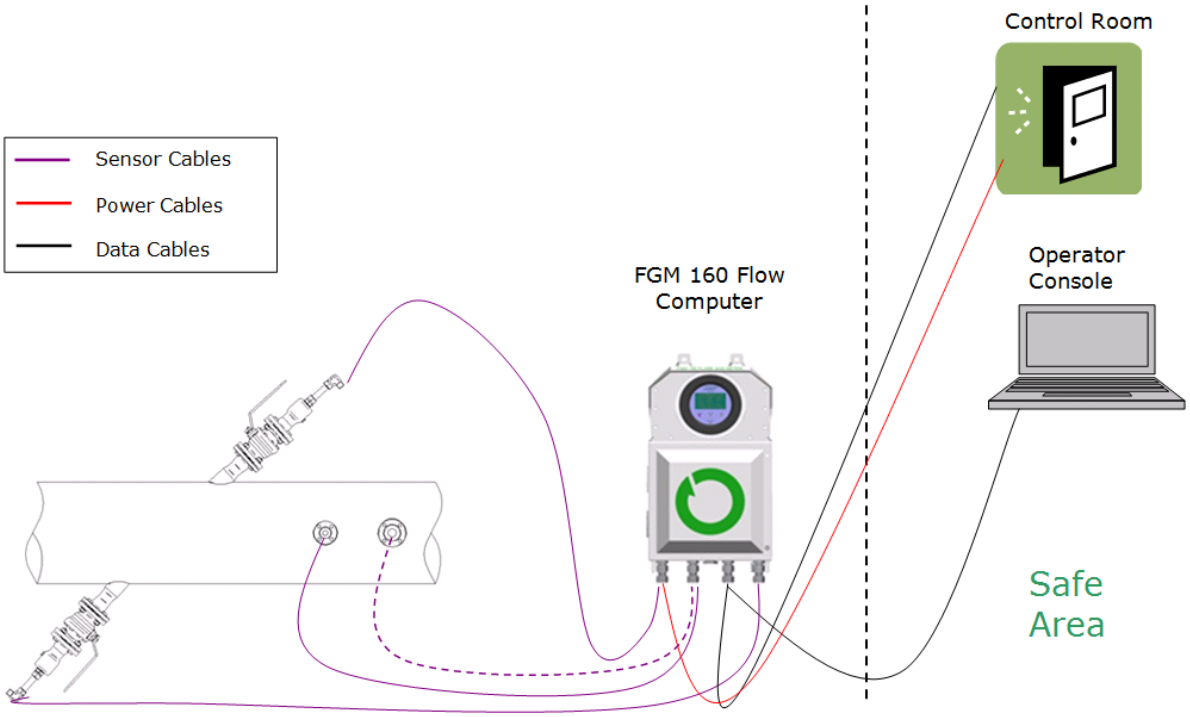


Figure 2: FGM 160 Hook-Up, with the Field Computer, Ultrasonic Transducers, Pressure and Temperature Transmitters, and connections to Safe Area equipment.

3.1.1 Electrical Connections

For detailed information regarding all electrical connections, please refer to Installation & Hook-Up Instructions [3].

3.1.2 Power Supply

The FGM 160 requires 24 VDC power supply (nominal). If 24 VDC is not available, an optional 110-230 VAC/24 VDC converter can be supplied by Fluenta.
For detailed equipment information and equipment ratings, please refer to Hazardous Area Installation Guidelines [1].

3.1.3 Input Signals

3.1.3.1 Ultrasonic Transducers

FGM 160 ultrasonic transducers are connected to the FGM 160 Field Computer by means of prefabricated signal cables included.

3.1.3.2 Pressure and Temperature Transmitters

The FGM 160 can be configured to accept analog 4-20 mA transmitters or HART compatible transmitters. The pressure and temperature transmitters may be omitted if the system is configured to get the pressure and temperature data from the DCS system (Modbus communication link).

3.1.4 Output Signals

3.1.4.1 Modbus Communication (RS-485)

The FGM 160 has two separate Modbus communication ports.
One is dedicated for communication with a DCS system. The second is a service port for configuration and monitoring of the FGM 160 system.
In the FGM 160 Foundation Fieldbus configuration, DCS Output is disabled.

3.1.4.2 Foundation Fieldbus Output

A maximum of four (4) parameters can be predefined according to customer requirements. The list of parameters available for the customer can be found in Fluenta AS doc. No. 72.120.305 (all parameters available by using Modbus Serial Interface are accessible using Foundation Fieldbus output).

3.1.4.3 Current Loop Outputs

Up to six (6) current loop outputs are available for output of selectable parameter values, where three (3) analog outputs are configured as the default. The 4-20 mA current loop output channels can be configured as active or passive outputs.
4-20 mA Outputs are replaced by FF Outputs in FGM 160 Foundation Fieldbus Configuration.

3.1.4.4 HART Output

One of the current loop outputs can be also configured for HART output communication. Refer to HART Output Interface Specification [5] for details.

3.1.4.5 Pulse/Frequency Output

The FGM 160 can be also configured to provide a pulse or frequency output signal. The pulse output will represent an incrementation of the totalizer (of e.g. volume or mass), whereas the frequency output will represent a process parameter (e.g. volume flow rate, mass flow rate etc.)

3.1.5 Electronic Modules in FGM 160

3.1.5.1 Digital Signal Processing (DSP) Module

The Digital Signal Processing module is the processing module in the system. The DSP Module generates the ultrasound measurement signals and controls the measurement sequences. It collects data from the other module registers and performs flow calculations based on this data. All calculated parameters are stored in defined registers. All of these registers are available for the Operator & Service Console through the Modbus service port at the I/O Module. A selection of these registers is also available for the DCS system (through the DCS port at the I/O Module).

3.1.5.2 Analog Front End (AFE) Module

The Analog Front End Module is the interface between the DSP Module and the ultrasonic transducers via the IS-Barrier unit. At the AFE Module, measurement signals are multiplexed and switched between upstream and downstream direction.

3.1.5.3 Pressure & Temperature (P&T) Module

The Pressure & Temperature Module collects pressure and temperature information from external sensors via 4-20 mA current loop or HART Interface. All pressure and temperature data are stored in predefined registers available for the DSP Module. Accordingly, the DSP unit can retrieve P&T parameters in a minimum amount of time.

3.1.5.4 Input/Output (I/O) Module

The Input/Output Module is the interface between the FGM 160 in hazardous areas and equipment in safe areas. At the I/O Module, 24 VDC (nom.) supply voltage is converted to the required operational voltages for the other modules. Furthermore, all signals and communications to and from the DCS system and Operator & Service Console are handled by this unit.

3.1.5.5 Intrinsic Safety Barrier (IS Barrier) Module

The Intrinsic Safety Barrier Module ensures the intrinsic safety for operation of the ultrasonic sensors mounted in hazardous area. In addition, the IS-Barrier Module includes safety barriers for the P&T transmitters. Therefore, the P&T transmitters with "Ex i" certification can be interfaced directly to the FGM 160. For specifications regarding the P&T transmitter barriers, please refer to Hazardous Area Installation Guidelines [1].

3.1.5.6 Surge Protection Module

The Surge protection Module protects the power input and the signal output lines from externally generated spikes, surges and overvoltage.

3.1.5.7 Local Display Module

The Local Display (LD) Module is the front unit, visible through the Ex-d safety glass. At the LD, a set of predefined metering process parameters can be viewed. In addition, four LEDs give the status of Power, Alarms, Measurement and Communication.

3.1.6 Non-Resettable Counter Function

The non-resettable counter function will record and keep the totalized volume and mass. The totalized values are accessible through the DCS Modbus interface or through the Operator & Service Console.

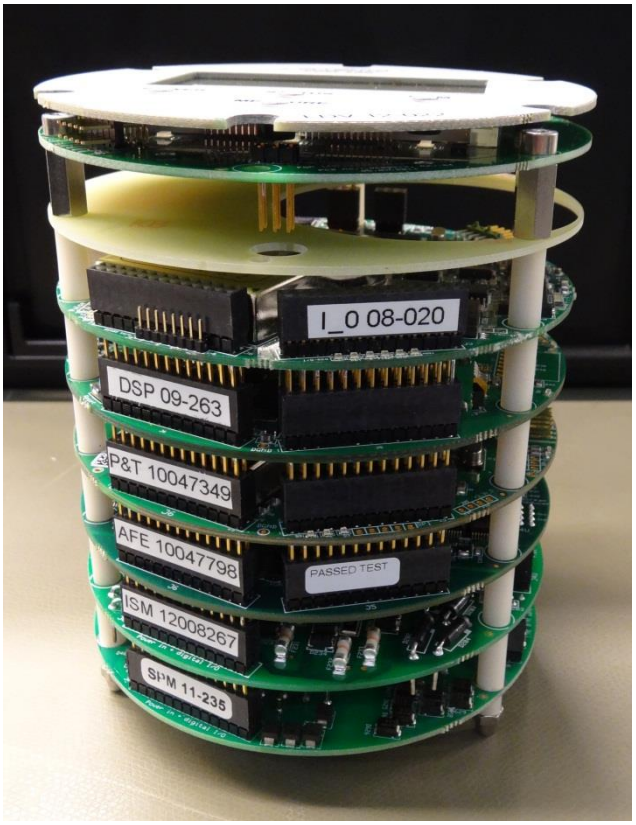


Figure 3 Electronic modules

3.2 Firmware Description

In the following sections a general description of the firmware for the different modules is outlined.

3.2.1 DSP Module

- The DSP Module initializes the system at start-up. Tasks are set to initial states and the system is ready for operation.
- The signals transmitted by the ultrasound transducers are generated by the DSP Module. The sequencing is controlled by this module, and, depending on the velocity of the medium in the pipe, either both Chirp and CW signals or just Chirp signals are used for the flow measurements. One

ultrasonic transit time measurement is always succeeded by an ultrasonic transit time measurement in the opposite direction.
- Data sampling and signal processing are carried out after a specified number of sequences. Then, the DSP module calculates the difference in transit time measurements and calculates the parameters available in the FGM system.
- Flow velocity and volume flow rate calculations run continuously, calculating new values based on data from the P&T module and transit time measurements from the ultrasonic transducers.
- Gas density and mass flow calculations are calculated based on calculated velocity of sound and measured pressure and temperature.
- Volume and mass totalising calculations are continuously updated based on volumetric and mass flow rate calculations.
- All system configuration parameters are stored in the Flash memory (non-volatile memory) at the DSP Module.
- The DSP Module carries out self-checking and evaluation of input and calculated parameters.

3.2.2 P&T Module

- The P&T Module continuously collects pressure and temperature values from the external pressure and temperature transmitters mounted downstream of the FGM 160. These readings are used in calculations performed by the DSP module.
- In addition to the external temperature reading, the P&T also reads the internal temperature value. This value is used to monitor the internal temperature in the Ex-d enclosure.

3.2.3 I/O Module

- The I/O Module handles all signals and communication with systems in Safe Area.
- Data requests and commands from the Operator Console are processed by the I/O Module. A predefined number of accessible parameters are available from the FGM. Accessible parameters depend on whether 4-20 mA, HART or Modbus is utilized.
- Software downloads to the DSP-, P&T- and I/O Module are carried out by the I/O-module.
- All data requests from DCS system are handled by the I/O Module; either through Modbus or HART interfaces.

3.3 Device Integrity

3.3.1 Self-Checking

The FGM 160 performs a self-checking sequence, where it checks that inputs from the transducers and Temperature and Pressure transmitters are within a valid range, and that other functions are operating as intended.

3.3.2 Watchdog Timer

The Watchdog Timer is initialized at start-up, and cannot be disabled, ensuring that in the unlikely situation of system hang-up occurring, the Watchdog Timer will reset the system forcing a complete reboot and start-up.

3.3.3 Flash Memory

System configuration is stored in Flash Memory (non-volatile memory). In case of a power break, all system configurations are reloaded from the Flash memory

3.4 Configuration and Operating Software

Through the FGM 160 Operating & Service Console (O&SC), the operator can monitor process data, configure the meter and specify process data to be saved to a data log file for later analysis. The O&SC further enables the operator to operate the meter remotely, by using e.g. a RS 485/TCP/IP converter and remote control software.
It should be noted, the O&SC is required to replace the default settings with actual applicable settings provided by customer. Fluenta service engineers and partners will always set up the FGM 160 according to the latest submitted parameters from the Client when installing and commissioning the FGM 160. Fluenta service engineers and partners always have the O&SC with them.

4. OPERATING PROCEDURE

4.1 Introduction

This section provides information about how to operate the FGM 160 field computer. The FGM 160 is a field mounted stand-alone ultrasonic gas flow measurement system, and does not require any safe area communication device in order to operate. However, in order to continuously monitor data and the meter performance, it is recommended to use the Operator & Service Console (O&SC). This program will provide hands-on process and status data continuously with possible remote access to the FGM 160 system from any remote system with the appropriate remote control software installed.

4.2 Power-Up Sequence

The power-up sequence describes the necessary handling of the FGM 160 in order to ensure correct operation. The power-up sequence is as follows:

1. Connect all power, input and output signals and communication cables according to the project specification and all relevant procedures and instructions.
2. Make sure that the power cable is connected to a suitable power source, either directly to a 24 VDC supply or through a 110-240 VAC/24 VDC converter.
3. Turn on the power to the FGM 160. There is no power switch on the FGM 160 Field Computer, so the power must be switched by an external switch or similar, preferably in safe area.
4. On startup, the FGM 160 will go through a boot and an initialization sequence before entering the standard operational (measurement) mode.
5. When the FGM 160 has entered the standard operational (measurement) mode, the meter will, according to the system configuration, carry out transit time measurements, retrieve pressure and temperature data, calculate volumetric and mass flow rates and either actively output a set of predefined parameters at the analog 4-20mA outputs, or make a set of process parameters available for DCS HART or Modbus communication.

4.3 Field Computer Configuration

The FGM 160 can be configured by using the Operator & Service Console. During manufacturing, default configuration is entered into the Field Computer. The system configuration will be modified by Fluenta service engineers or partners when installing and commissioning the meter. This configuration can be changed at any time by using the Operator & Service Console (O&SC). All system configuration parameters are stored in a non-volatile memory, ensuring that no configuration parameters are lost in case of power loss. Appendix II explains how to insert or modify system configuration according to a Client parameter list.

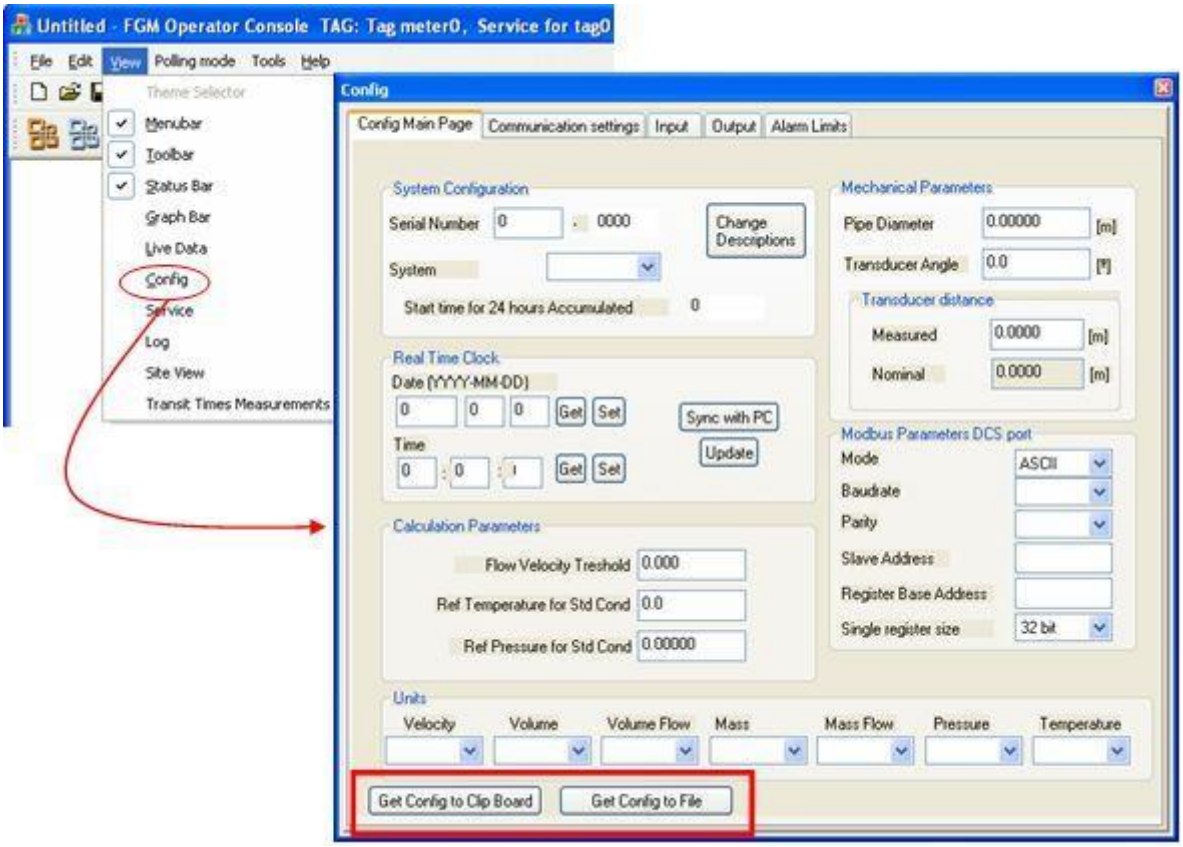


Figure 4: Download of system configuration using the Operator & Service Console.

The system configuration parameter file can be downloaded from the FGM 160 using the Operator & Service Console, ref. Figure 4, by entering the "Config Main Page" through the "View – Config" menu bar. The system configuration can either be copied to the clipboard and pasted into a document, or saved directly to a file.
For a full listing of a system configuration file, refer to Appendix I.
Some of the system configuration parameters are also available through the DCS Modbus registers. However, parameters that should only be accessed by authorized personnel are not accessible through this communication line. For a full listing of accessible configuration parameters through the DCS Modbus interface, refer to DCS Modbus Interface Specifications [4].

4.4 Local Display Functions

The FGM 160 is equipped with a local LCD display mounted at the front, and visible through the Ex-d safety glass. The display shows predefined process parameters from the FGM 160. Further, 4 status LEDs are visible at the front for the following status information:

- **Power**
  This LED will have a green light when the system power is ON.

- **Status**
  This LED will light:
  GREEN; if no Alarms are active (system status OK).

- **Comm**
  This LED will light:
  GREEN; during Modbus frame reception or sending.

- **Meas**
  This LED will blink GREEN at a regular cycle, indicating that ultrasonicmeasurement cycle sequence is active.

4.5 Error Check and Troubleshooting

The operator should not perform extensive troubleshooting beyond the scope that is described in this section. For repair and module replacement, contact Fluenta AS.

Fluenta AS
Haraldsgate 90
P.O. Box 420
N-5501 Haugesund
NORWAY

Phone: +47 21 02 19 27
E-mail: support@fluenta.com

Error check can be carried out by using the Operator & Service Console

NOTE!

Before any work can be carried out with the FGM 160 field computer, a hot work permit must be obtained.

Do not connect or disconnect any signal wires unless the power is turned OFF!

Do not open the Ex-d enclosure containing the field electronics in hazardous area, without making sure first that the conditions permit such action. Preferably, and as a general rule; the Ex-d enclosure should only be opened indoors in e.g. a workshop in safe area.

4.5.1 Error Check with Local Display

As described in Section 4.4, Four (4) LEDs are visible at the front with status information. If one or more of these LEDs do not have a GREEN light color indicating OK status, the following status is present and actions should be taken:

- **Power**
  Indication: The LED is not ON (no green light).
  Status: System Power is OFF, or LED does not work.
  Action: Check that the system Power wires are connected and that 24 VDC is present at the power input terminals.

- **Meas**
  Indication: The LED is steady OFF or steady GREEN.
  Status: The FGM 160 is not in standard operational (measurement) mode.
  Action: Check the Alarm log for any error messages indicating any cause for the problem. Turn the system Power OFF and ON again. If the situation remains unchanged, contact Fluenta AS for guidance.

4.5.2 Error Check with O&SC

Through the FGM 160 Operator & Service Console, data can be logged for trend analysis and evaluation. Data can be logged to a data file and imported in e.g. Excel spreadsheet for plot and analysis.

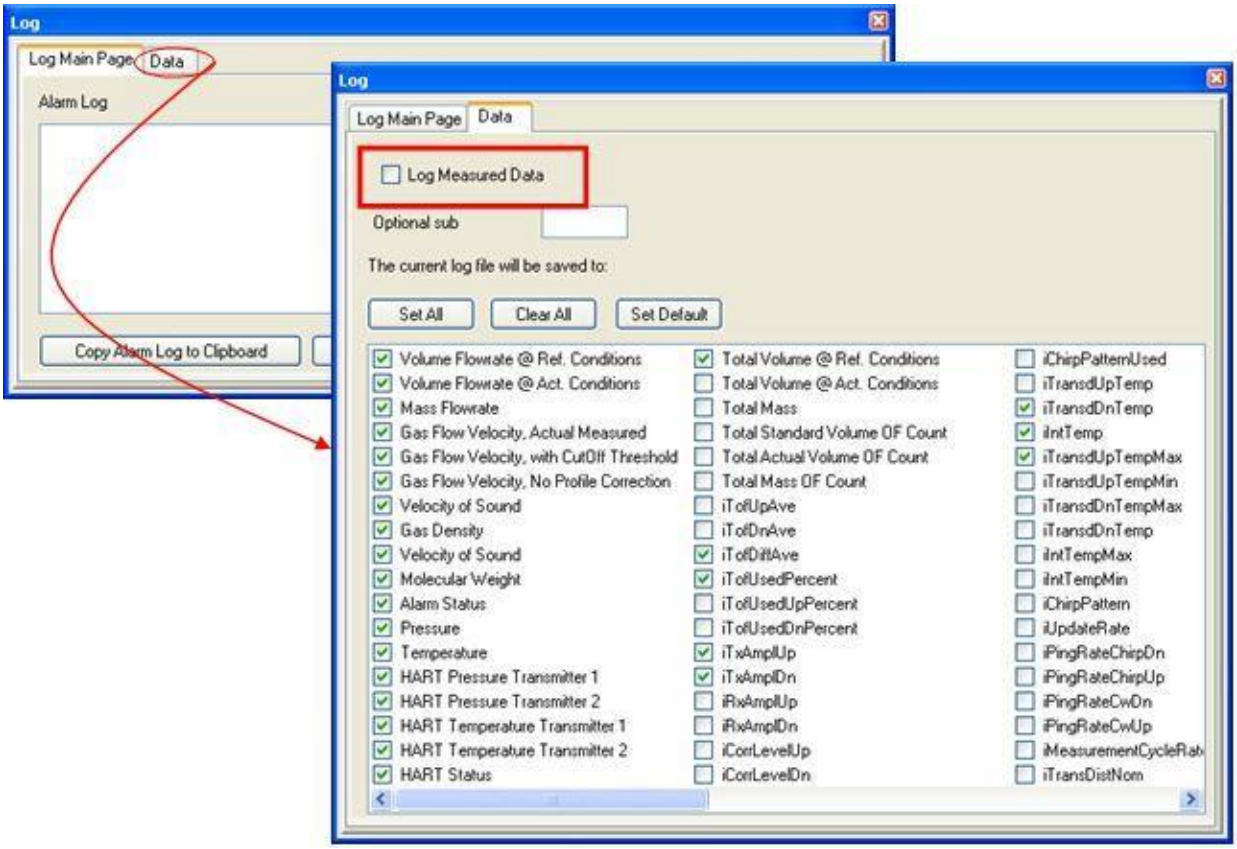


Figure 5: By activating the "Log Measurement Data" function at the "Log Data" window, any or most parameters can be logged to a data file. The data log file name will be generated automatically based on the current date and time.

By using the Operator & Service Console, it is also possible to carry out remote diagnostics. Thus, a Fluenta AS service engineer, being granted access to a specific system by the end operator, can monitor the performance of the meter and carry out analyses based on logged and live data. This function requires internet connection, and communication wires to service port.

5. REFERENCES

[1] FGM 160 – Hazardous Area Installation Guidelines
[2] FGM 160 – Hazardous Area Certificates
[3] FGM 160 – Installation & Hook-Up Instructions
[4] FGM 160 – DCS Modbus Interface Specifications
[5] FGM 160 – HART Output Interface Specification

6. APPENDIX I – SYSTEM CONFIGURATION FILE

```
**********************************************************
**********************************************************
******************                          ***************
******************        Fluenta AS        ***************
******************  FGM 160 parameter list  ***************
******************                          ***************
**********************************************************
**********************************************************

Operator Console ver.:          1.040

Field Computer, date and time: 2011-01-17   09:13:25

****************************************
********** System Parameters **********
****************************************
Field Computer Type:            FGM 160
Serial number:                  2006-0102
Tag number:                     1-TAG-1
Company:                        FLUENTA AS
Installation:                   Sandbrekkeveien 85
Description:                    10" LP Flare

System Configuration:           Single system (ch1)
Local Display:                  Not installed <- You have to change it manually
SW Version DSP:                 0.052           to version number that is installed
SW-app Version I/O:             1.007           using AVR Studio
SW-boot Version I/O:            0.006
SW-app Version P&T:             0.257
SW-boot Version P&T:            0.005


******************************************
********** Communication Parameters **********
******************************************

**************** DCS communication **********
------------------------------------------------------
DCS Modbus Communication:       Enabled
Slave address:                  224
Type:                           RTU
Baud rate:                      38400
Data bits:                      8
Parity:                         No Parity
Stop bit:                       2
Register Values:                32 bit floating point (IEEE-754)
Register size in request:       32 bits
```

EXAMPLE

Register base address: 1000

********** HART communication **********

HART Output Communication: Enabled
Poll address: 1
Primary Variable: Total Volume @ Ref. Conditions
Secondary Variable: Volume Flowrate @ Ref. Conditions
Tertiary Variable: Temperature
Quaternary Variable: Pressure

********** Service port **********

Slave address: 1
Type: RTU
Baud rate: 38400
Data bits: 8
Parity: None
Stop bits: 2
Register Values: 32 bit floating point (IEEE-754)

****
********** System Configuration **********
****

Pipe diameter: 0.3800 m
Transducer distance (M): 0.5370 m
Transducer angle: 45.0 deg

EXAMPLE

******* Units *******
Velocity: m/s
Volume: m3
Volume flow: m3/h (Cubic meter pr. hour)
Mass: kg
Mass flow: kg/h
Pressure: BarA
Temperature: Celsius

Log time for 24h acc. values: 06:00:00

****
********** Input Signal Parameters **********
****
Pressure input Current Loop (4-20mA)
Temperature input Current Loop (4-20mA)
Current loop ranges

Temperature, 4mA value:	255.15 [Kelvin]
Temperature, 20mA value:	533.15 [Kelvin]
Pressure, 4mA value:	1.013 [BarA]
Pressure, 20mA value:	12.044 [BarA]

Current loop calibration coefficients

Temperature, offset:	0.0070
Temperature, scale:	0.9963
Pressure, offset:	0.0220
Pressure, scale:	0.9980

Alarm limits

Temperature, Hi limit:	533.15 [Kelvin]
Temperature, Lo limit:	255.15 [Kelvin]
Pressure, Hi limit:	12.044 [BarA]
Pressure, Lo limit:	1.013 [BarA]

****
********** Output signal parameters **********
****

******** Current loops, 4-20mA ********

Current loop 1, Parameter:	Volume Flowrate @ Act. Conditions
Current loop 2, Parameter:	Molecular Weight
Current loop 3, Parameter:	Testvalue Current Loop 3
Current loop 4, Parameter:	Testvalue Current Loop 4
Current loop 5, Parameter:	Testvalue Current Loop 5
Current loop 6, Parameter:	Testvalue Current Loop 6

Current loop ranges

Current loop 1, 4mA value:	0.00
Current loop 1, 20mA value:	2124000.00
Current loop 2, 4mA value:	0.00
Current loop 2, 20mA value:	50.00
Current loop 3, 4mA value:	4.00
Current loop 3, 20mA value:	20.00
Current loop 4, 4mA value:	4.00
Current loop 4, 20mA value:	20.00
Current loop 5, 4mA value:	4.00
Current loop 5, 20mA value:	20.00
Current loop 6, 4mA value:	4.00
Current loop 6, 20mA value:	20.00

Current loop calibration coefficients

Current loop 1, offset:	-0.1217
Current loop 1, scale:	0.9980
Current loop 2, offset:	-0.1647
Current loop 2, scale:	1.0045
Current loop 3, offset:	-0.1633
Current loop 3, scale:	1.0018

EXAMPLE

Current loop 4, offset:	-0.2105
Current loop 4, scale:	1.0025
Current loop 5, offset:	-0.0232
Current loop 5, scale:	1.0078
Current loop 6, offset:	-0.1358
Current loop 6, scale:	1.0058

****
******** Measurement/Signal Parameters *******
****

CW velocity limit up (CW/Chirp -> Chirp):	15 m/s
CW velocity limit down (Chirp -> CW/Chirp):	14 m/s
Chirp Pattern:	LinFM
Chirp Limit1 (ArcTan FM -> Lin FM):	25 m/s
Chirp Limit2 (Lin FM ->ArcTan FM):	50 m/s
Low cutoff velocity:	0.05 m/s
Max. velocity:	100 m/s
Min. velocity:	0 m/s
Max. velocity jump:	50 m/s
Max. sound velocity:	500 m/s
Min. sound velocity:	250 m/s
Max. sound velocity jump:	70 m/s
Historical sound vel. weight factor:	40.0
Z Standard:	1.000
Z Operational:	1.000
Ref Temperature (std. conditions):	15.00 ºC
Ref Pressure (std. conditions):	1.01325 BarA

EXAMPLE

****
******** Sensor Calibration Parameters *******
****

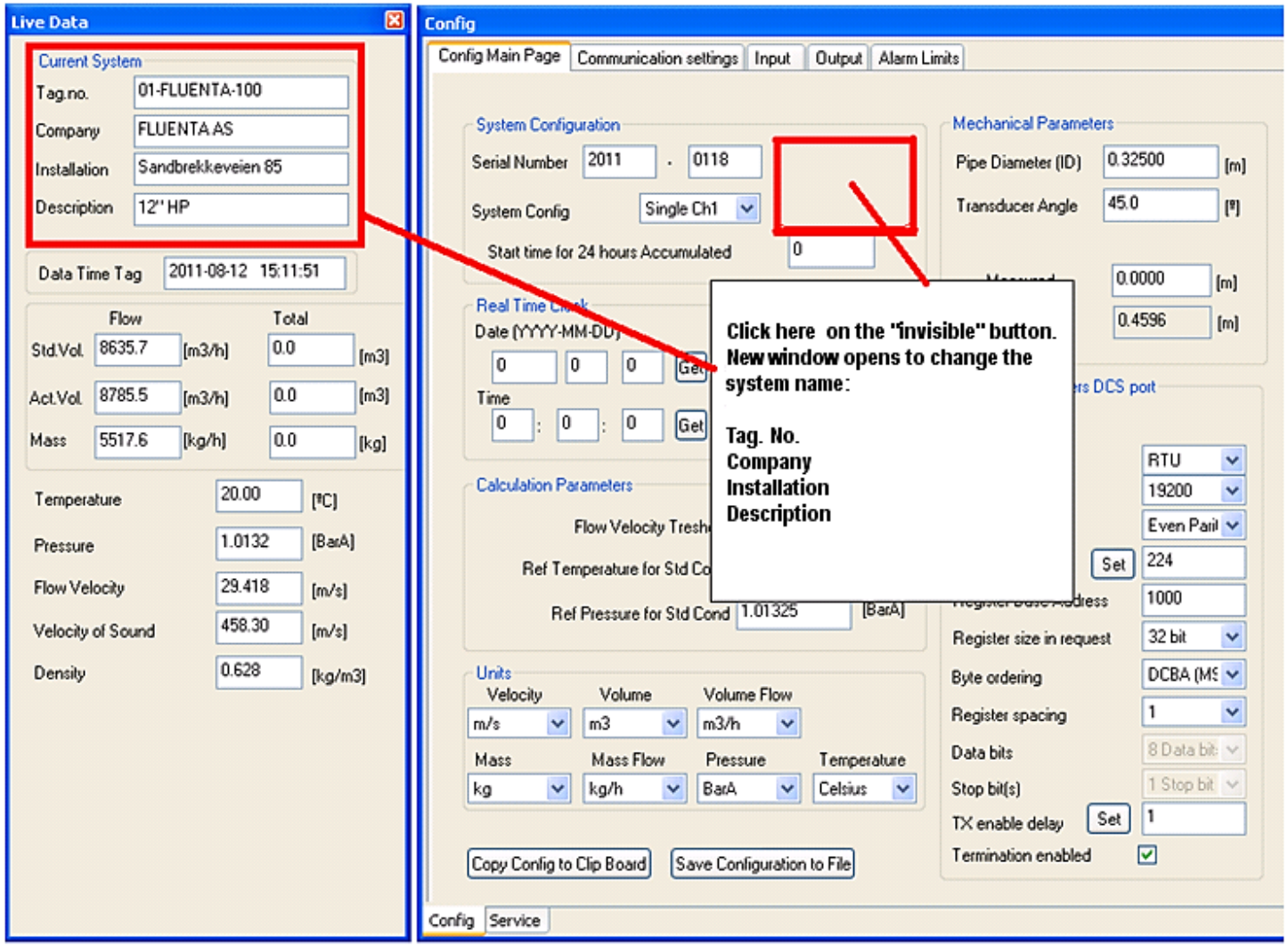
Serial No., Upstream Transducer (A):	022U-11
Serial No., Downstream Transducer (B):	022D-11
CW frequency:	68.00 kHz

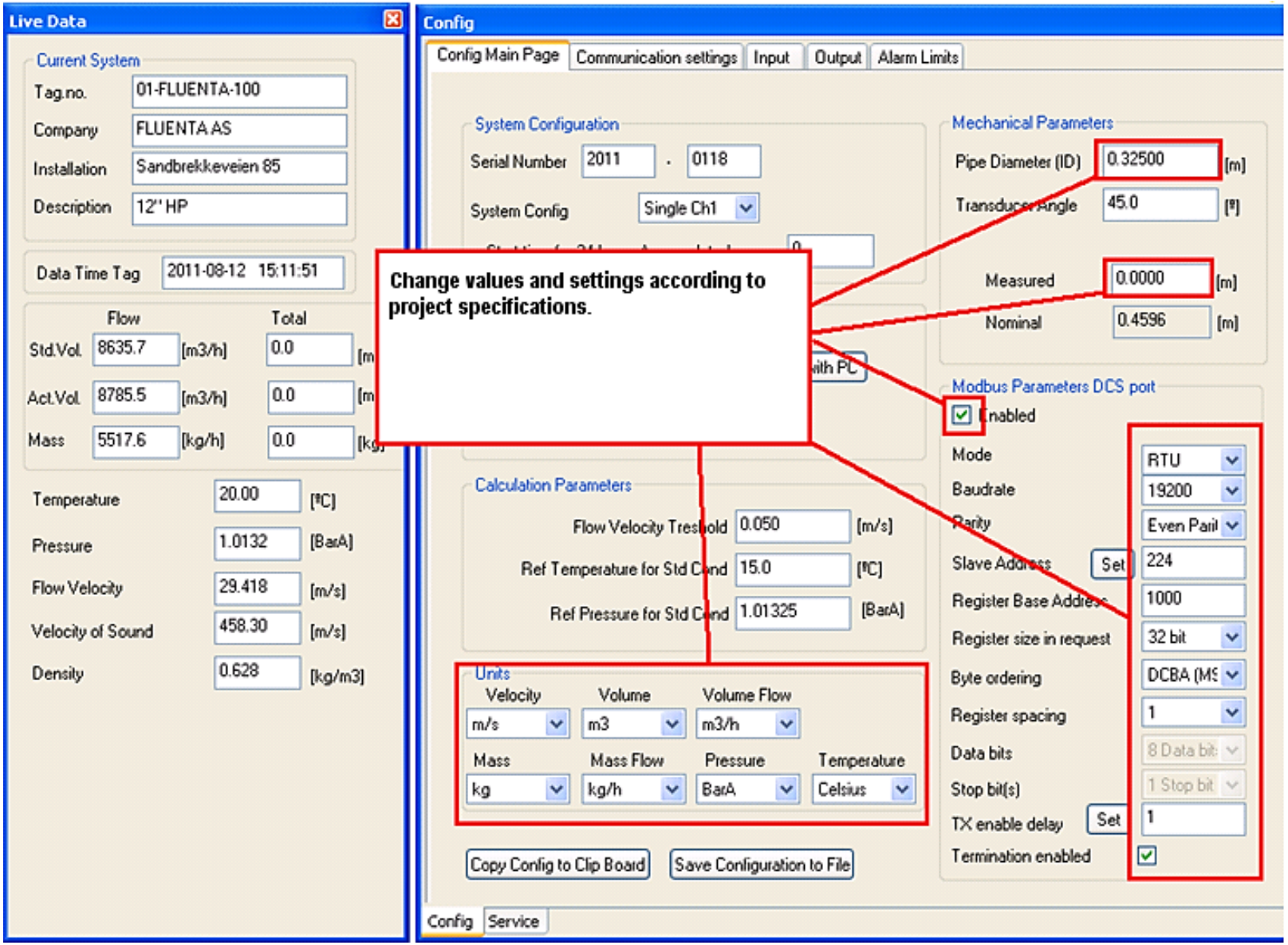
*** Transducer delays (calibration coefficients) ***

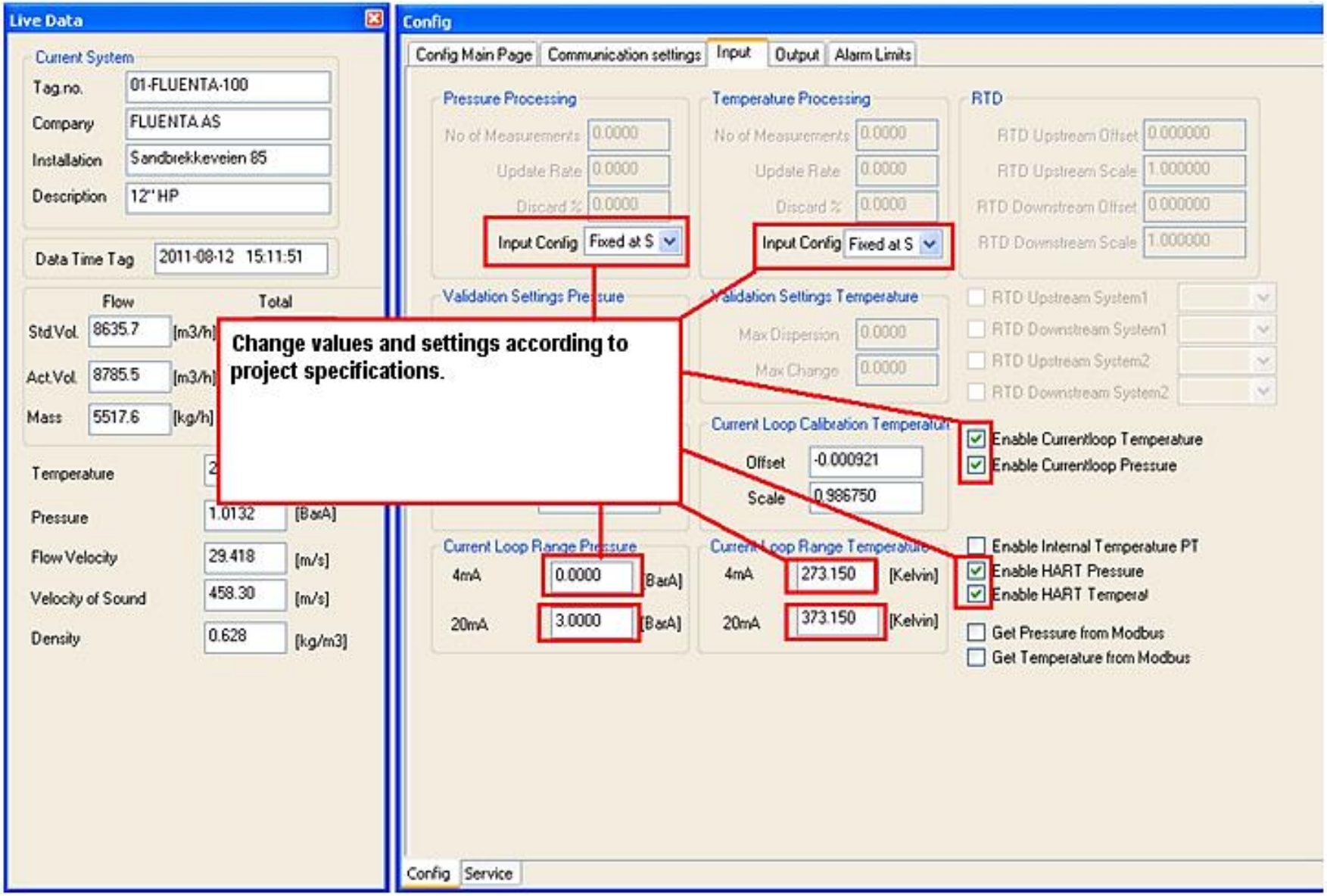
Chirp upstream:	31818.0 nsec
Chirp downstream:	33318.0 nsec
CW upstream:	12557.0 nsec
CW downstream:	12576.0 nsec
Delta CW correction:	0.0 nsec

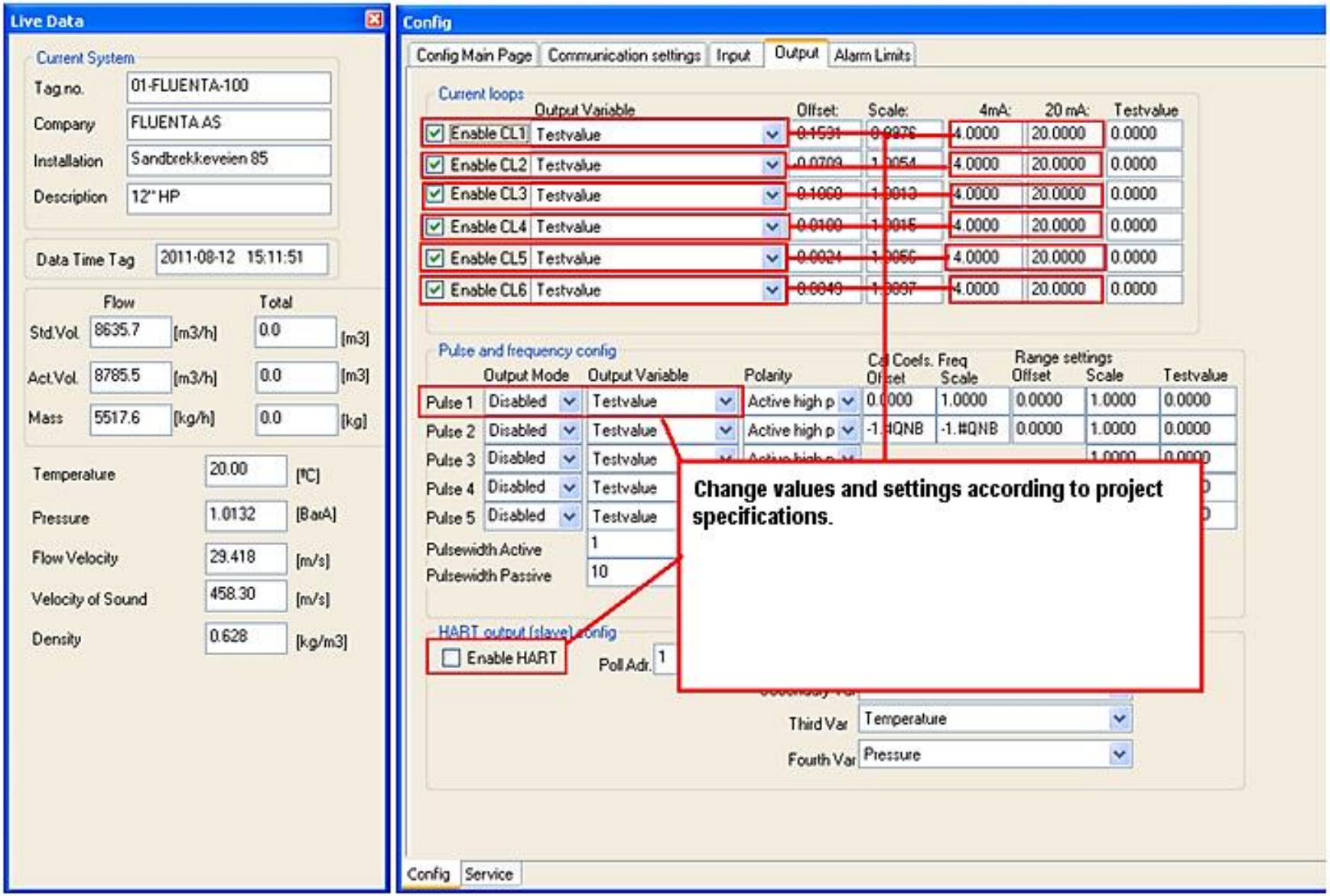
---------- END ----------

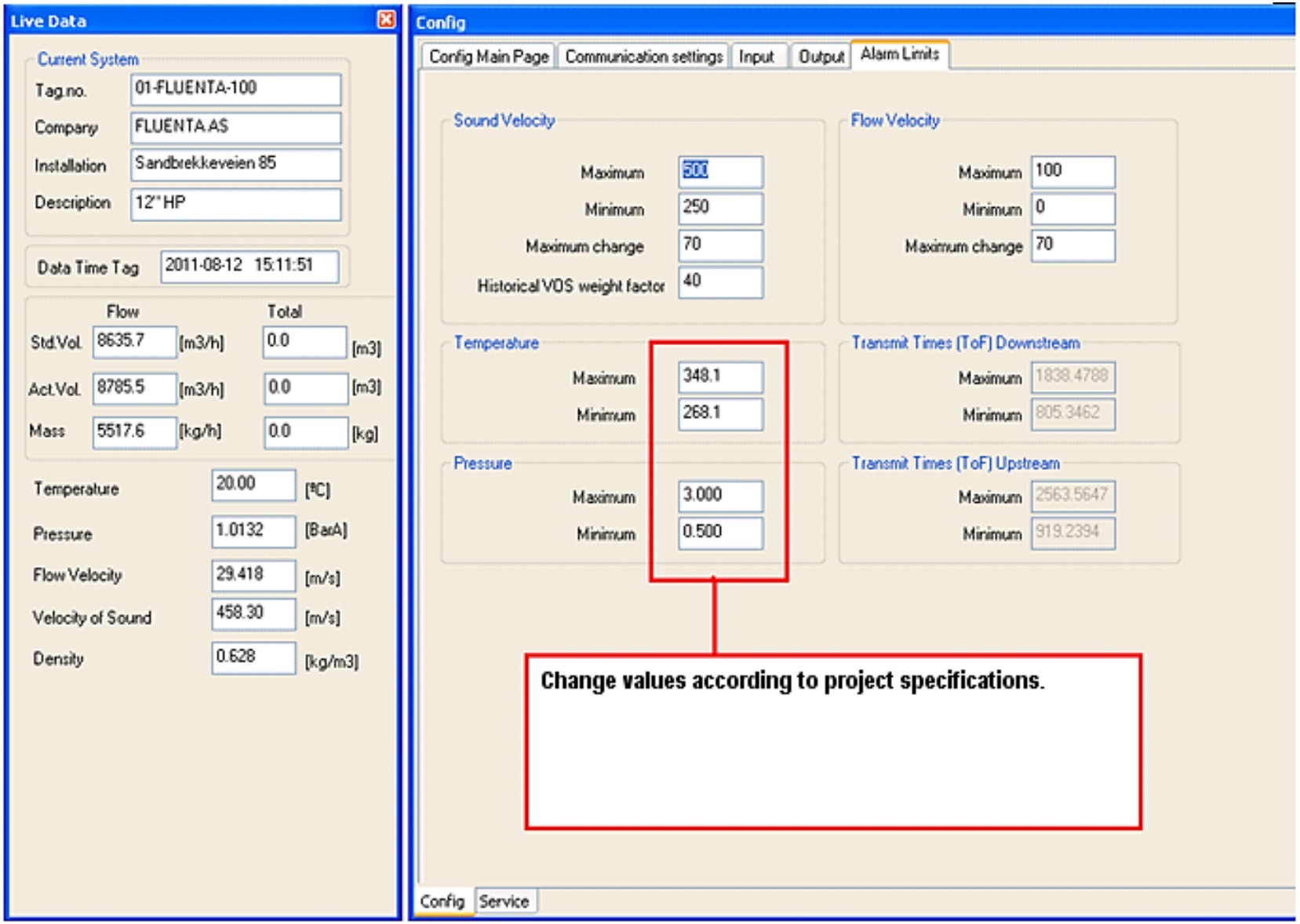
7. APPENDIX II – INSERTING SETTINGS FROM CLIENT PARAMETER LIST

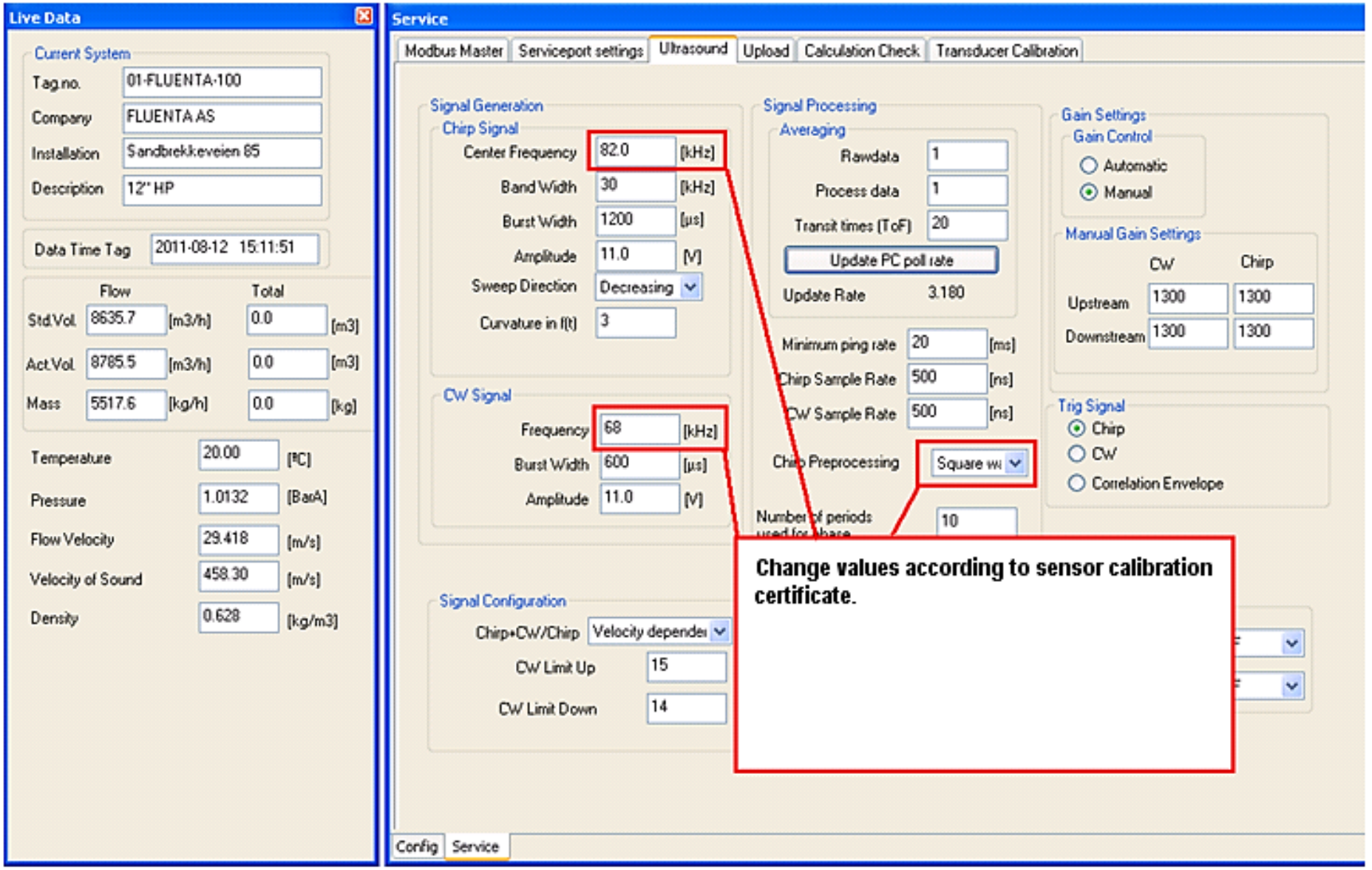


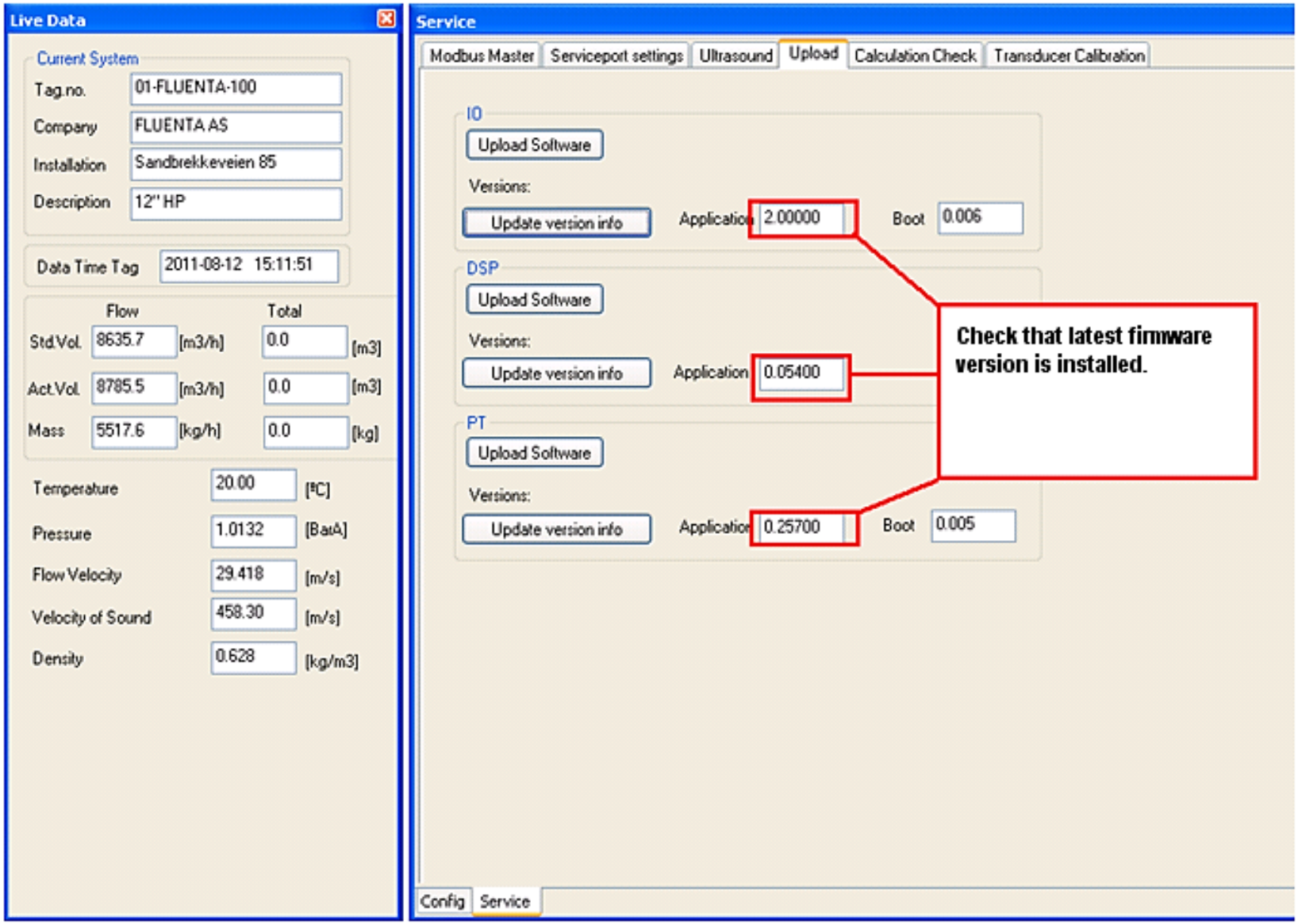

Live Data
Current System
Tag.no. 01-FLUENTA-100
Company FLUENTA AS
Installation Sandbrekkeveien 85
Description 12" HP
Data Time Tag 2011-08-12 15:11:51
Flow
Total
Std.Vol. 8635.7 [m3/h] 0.0
Act.Vol. 8785.5 [m3/h] 0.0
Mass 5517.6 [kg/h] 0.0
Temperature 20.00 [°C]
Pressure 1.0132 [BarA]
Flow Velocity 29.418 [m/s]
Velocity of Sound 458.30 [m/s]
Density 0.628 [kg/m3]
Config
Config Main Page
Communication settings
Input
Output
Alarm Limits
System Configuration
Serial Number 2011 . 0118
System Config Single Ch1
Change values and settings according to project specifications.
Mechanical Parameters
Pipe Diameter (ID) 0.32500 [m]
Transducer Angle 45.0 [°]
Measured 0.0000 [m]
Nominal 0.4596 [m]
Modbus Parameters DCS port
Enabled
Mode RTU
Baudrate 19200
Parity Even Pari
Slave Address Set 224
Register Base Addres 1000
Register size in request 32 bit
Byte ordering DCBA (MS
Register spacing 1
Data bits 8 Data bit
Stop bit(s) 1 Stop bit
TX enable delay Set 1
Termination enabled
Calculation Parameters
Flow Velocity Treshold 0.050 [m/s]
Ref Temperature for Std Cond 15.0 [°C]
Ref Pressure for Std Cond 1.01325 [BarA]
Units
Velocity m/s
Volume m3
Volume Flow m3/h
Mass kg
Mass Flow kg/h
Pressure BarA
Temperature Celsius
Copy Config to Clip Board
Save Configuration to File
Config
Service

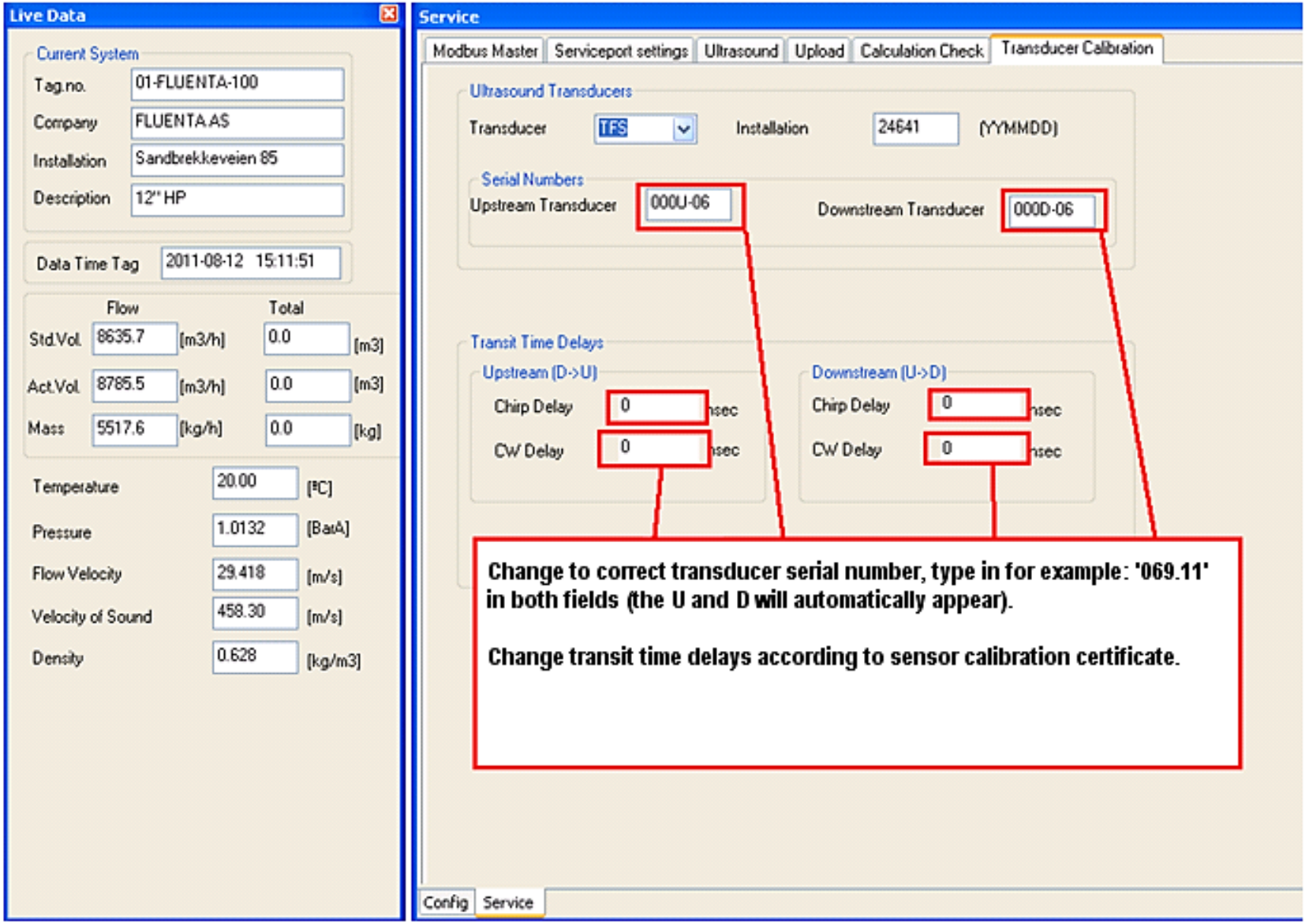

Live Data
Current System
Tag.no. 01-FLUENTA-100
Company FLUENTA AS
Installation Sandbrekkeveien 85
Description 12" HP
Data Time Tag 2011-08-12 15:11:51
Flow
Total
Std.Vol. 8635.7 [m3/h]
Act.Vol. 8785.5 [m3/h]
Mass 5517.6 [kg/h]
Temperature
Pressure 1.0132 [BarA]
Flow Velocity 29.418 [m/s]
Velocity of Sound 458.30 [m/s]
Density 0.628 [kg/m3]
Config
Config Main Page
Communication settings
Input
Output
Alarm Limits
Pressure Processing
No of Measurements 0.0000
Update Rate 0.0000
Discard % 0.0000
Input Config Fixed at S
Temperature Processing
No of Measurements 0.0000
Update Rate 0.0000
Discard % 0.0000
Input Config Fixed at S
RTD
RTD Upstream Offset 0.000000
RTD Upstream Scale 1.000000
RTD Downstream Offset 0.000000
RTD Downstream Scale 1.000000
Validation Settings Pressure
Validation Settings Temperature
Max Dispersion 0.0000
Max Change 0.0000
RTD Upstream System1
RTD Downstream System1
RTD Upstream System2
RTD Downstream System2
Change values and settings according to project specifications.
Current Loop Calibration Temperature
Offset -0.000921
Scale 0.986750
Enable Currentloop Temperature
Enable Currentloop Pressure
Current Loop Range Pressure
4mA 0.0000 [BarA]
20mA 3.0000 [BarA]
Current Loop Range Temperature
4mA 273.150 [Kelvin]
20mA 373.150 [Kelvin]
Enable Internal Temperature PT
Enable HART Pressure
Enable HART Temperal
Get Pressure from Modbus
Get Temperature from Modbus
Config
Service


Live Data
Current System
Tag no. 01-FLUENTA-100
Company FLUENTA AS
Installation Sandbrekkeveien 85
Description 12" HP
Data Time Tag 2011-08-12 15:11:51
Flow
Total
Std.Vol. 8635.7 [m3/h] 0.0 [m3]
Act.Vol. 8785.5 [m3/h] 0.0 [m3]
Mass 5517.6 [kg/h] 0.0 [kg]
Temperature 20.00 [°C]
Pressure 1.0132 [BarA]
Flow Velocity 29.418 [m/s]
Velocity of Sound 458.30 [m/s]
Density 0.628 [kg/m3]
Config
Config Main Page
Communication settings
Input
Output
Alarm Limits
Current loops
Output Variable
Offset:
Scale:
4mA:
20 mA:
Testvalue
Enable CL1 Testvalue 4.0000 20.0000 0.0000
Enable CL2 Testvalue 4.0000 20.0000 0.0000
Enable CL3 Testvalue 4.0000 20.0000 0.0000
Enable CL4 Testvalue 4.0000 20.0000 0.0000
Enable CL5 Testvalue 4.0000 20.0000 0.0000
Enable CL6 Testvalue 4.0000 20.0000 0.0000
Pulse and frequency config
Output Mode
Output Variable
Polarity
Cal Coefs. Freq
Offset
Scale
Range settings
Offset
Scale
Testvalue
Pulse 1 Disabled Testvalue Active high p 1.0000 0.0000 1.0000 0.0000
Pulse 2 Disabled Testvalue Active high p -1.#QNB -1.#QNB 0.0000 1.0000 0.0000
Pulse 3 Disabled Testvalue
Pulse 4 Disabled Testvalue
Pulse 5 Disabled Testvalue
Pulsewidth Active 1
Pulsewidth Passive 10
HART output (slave) config
Enable HART
Poll Adr. 1
Third Var Temperature
Fourth Var Pressure
Change values and settings according to project specifications.
Config
Service


Live Data
Current System
Tag no. 01-FLUENTA-100
Company FLUENTA AS
Installation Sandbrekkeveien 85
Description 12" HP
Data Time Tag 2011-08-12 15:11:51
Flow
Total
Std.Vol. 8635.7 [m3/h] 0.0 [m3]
Act.Vol. 8785.5 [m3/h] 0.0 [m3]
Mass 5517.6 [kg/h] 0.0 [kg]
Temperature 20.00 [°C]
Pressure 1.0132 [BarA]
Flow Velocity 29.418 [m/s]
Velocity of Sound 458.30 [m/s]
Density 0.628 [kg/m3]
Config
Config Main Page
Communication settings
Input
Output
Alarm Limits
Sound Velocity
Maximum 500
Minimum 250
Maximum change 70
Historical VOS weight factor 40
Flow Velocity
Maximum 100
Minimum 0
Maximum change 70
Temperature
Maximum 348.1
Minimum 268.1
Transmit Times (ToF) Downstream
Maximum 1838.4788
Minimum 805.3462
Pressure
Maximum 3.000
Minimum 0.500
Transmit Times (ToF) Upstream
Maximum 2563.5647
Minimum 919.2394
Change values according to project specifications.
Config
Service


Live Data
Current System
Tag.no. 01-FLUENTA-100
Company FLUENTA AS
Installation Sandbrekkeveien 65
Description 12" HP
Data Time Tag 2011-08-12 15:11:51
Flow
Total
Std.Vol. 8635.7 [m3/h] 0.0 [m3]
Act.Vol. 8785.5 [m3/h] 0.0 [m3]
Mass 5517.6 [kg/h] 0.0 [kg]
Temperature 20.00 [°C]
Pressure 1.0132 [BarA]
Flow Velocity 29.418 [m/s]
Velocity of Sound 458.30 [m/s]
Density 0.628 [kg/m3]
Service
Modbus Master
Serviceport settings
Ultrasound
Upload
Calculation Check
Transducer Calibration
Signal Generation
Chirp Signal
Center Frequency 82.0 [kHz]
Band Width 30 [kHz]
Burst Width 1200 [µs]
Amplitude 11.0 [V]
Sweep Direction Decreasing
Curvature in f(t) 3
CW Signal
Frequency 68 [kHz]
Burst Width 600 [µs]
Amplitude 11.0 [V]
Signal Configuration
Chirp+CW/Chirp Velocity depende
CW Limit Up 15
CW Limit Down 14
Signal Processing
Averaging
Rawdata 1
Process data 1
Transit times (ToF) 20
Update PC poll rate
Update Rate 3.180
Minimum ping rate 20 [ms]
Chirp Sample Rate 500 [ns]
CW Sample Rate 500 [ns]
Chirp Preprocessing Square wi
Number of periods
10
Change values according to sensor calibration certificate.
Gain Settings
Gain Control
Automatic
Manual
Manual Gain Settings
CW
Chirp
Upstream 1300 1300
Downstream 1300 1300
Trig Signal
Chirp
CW
Correlation Envelope
Config
Service


Live Data
Current System
Tag.no. 01-FLUENTA-100
Company FLUENTA AS
Installation Sandbrekkeveien 85
Description 12" HP
Data Time Tag 2011-08-12 15:11:51
Flow
Total
Std.Vol. 8635.7 [m3/h] 0.0 [m3]
Act.Vol. 8785.5 [m3/h] 0.0 [m3]
Mass 5517.6 [kg/h] 0.0 [kg]
Temperature 20.00 [ºC]
Pressure 1.0132 [BarA]
Flow Velocity 29.418 [m/s]
Velocity of Sound 458.30 [m/s]
Density 0.628 [kg/m3]
Service
Modbus Master
Serviceport settings
Ultrasound
Upload
Calculation Check
Transducer Calibration
IO
Upload Software
Versions:
Update version info
Application 2.00000
Boot 0.006
DSP
Upload Software
Versions:
Update version info
Application 0.05400
PT
Upload Software
Versions:
Update version info
Application 0.25700
Boot 0.005
Check that latest firmware version is installed.
Config
Service


Live Data
Current System
Tag.no. 01-FLUENTA-100
Company FLUENTA AS
Installation Sandbrekkeveien 85
Description 12" HP
Data Time Tag 2011-08-12 15:11:51
Flow
Total
Std.Vol. 8635.7 [m3/h] 0.0 [m3]
Act.Vol. 8785.5 [m3/h] 0.0 [m3]
Mass 5517.6 [kg/h] 0.0 [kg]
Temperature 20.00 [°C]
Pressure 1.0132 [BarA]
Flow Velocity 29.418 [m/s]
Velocity of Sound 458.30 [m/s]
Density 0.628 [kg/m3]
Service
Modbus Master
Serviceport settings
Ultrasound
Upload
Calculation Check
Transducer Calibration
Ultrasound Transducers
Transducer TFS
Installation 24641 (YYMMDD)
Serial Numbers
Upstream Transducer 000U-06
Downstream Transducer 000D-06
Transit Time Delays
Upstream (D->U)
Chirp Delay 0 nsec
CW Delay 0 nsec
Downstream (U->D)
Chirp Delay 0 nsec
CW Delay 0 nsec
Change to correct transducer serial number, type in for example: '069.11' in both fields (the U and D will automatically appear).
Change transit time delays according to sensor calibration certificate.
Config
Service